Space Weather Forecast

Issued on Tuesday, 08 August 2023 at 01:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate storm likely from CME arrival day 1 (08 Aug). Recent Strong flare (R3 Blackout) from over NW limb, bringing a likelihood of reaching S1 day 1. Further R1-R2 Blackouts likely day 1.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High due to a Strong flare (X1.5) observed from a sunspot that is now over the northwest limb, peaking at 07/2046 UTC. Three other Moderate flares were also observed, one from the same region, and two others from another region in the northwest. Despite a relatively small size, this is the most active of the ten visible regions on the disc, likely due to it having an unusual orientation, with its spots aligned more north-south rather than east-west, along with some ongoing development. However, this region is now difficult to accurately assess due to its location close to the northwest limb. The largest region on the disc is now approaching the south-centre disc, but has remained stable despite the development of some small spots around the main spot.

No Earth-directed CMEs (coronal mass ejections) were observed in the last 24 hours, with the fast CME from the strong flare passing ahead of Earth.

Solar Wind / Geomagnetic Activity: A couple of weak and tentative CME arrivals perhaps occurred during this period, at 07/0010 and 07/1105 UTC. The solar wind speed was initially weak at 400km/s, but rose gradually to be elevated at around 500km/s after 07/1200 UTC. The main signal for the CMEs was the interplanetary magnetic field strength (Bt). This suddenly increased from weak at 07/0000 UTC to be moderate at 07/0200 UTC, then smoothly eased back to weak levels by 07/1100 UTC. This then rose suddenly again, to peak briefly moderate (stronger than before) before easing back to background from 07/1600 nT. The north-south direction also rotated gradually through the period giving periods of moderate negative (southward) and moderate positive (northward) field. Geomagnetic activity was mostly Quiet to Unsettled (Kp0-3), but with one Active interval 07/2100-0000 UTC.

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) is below the S1 Minor Storm level, having seen a mainly declining trend after Moderate and Strong flaring from the complex region on 05 Aug. However this region, which has now rotated around the northwest limb, gave a further Strong flare on 07 Aug, and this resulted in a further slight enhancement, with an increasing trend since 07/2100 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Further Moderate flares are likely day 1 (08 Aug), mainly from the sunspot over the northwest limb or the other complex region also in the northwest. The potential for further observable flares from over the limb soon recedes however, along with this other potentially flaring spot also disappearing over the northwest limb on day 2 (09 Aug). Activity likely declining to Low but with a chance of rising to Moderate each day, day 3 (10 Aug) onward

Solar Wind / Geomagnetic Activity: There are one or two further CME arrivals possible on day 1 (08 Aug). These are the CMEs from the Moderate flare and the Strong flare on 05 Aug, although the former has potentially already arrived as a weak enhancement on 07 Aug. The latter is low confidence, due to the northwestern location of the source region, with the subsequent CME likely giving a glancing impact. Any enhancement day 1, perhaps persisting into day 2 (08-09 Aug) is likely to then ease with solar winds declining towards background day 3-4 (10-11 Aug). Any CME arrival or arrivals day 1 (08 Aug) are expected to give Active to

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G1/Minor Storm intervals, and a chance of G2 Moderate Storms. Otherwise, activity is expected to ease to be mainly Quiet with Unsettled intervals, mainly later day 2 (09 Aug) onward.
Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to continue rising day 1 (08 Aug), above the S1 Minor Radiation storm level, before likely declining below this level again later on day 1. There remains a slight chance of further enhancements the region around the limb however this risk decreases by day 3 (10 Aug) as it continues further around the far-side. The proton flux is then expected to continue gradually easing back towards background.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	20	1	1
Strong	G3	No	10	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	55	40	40
Very Active	R3 to R5 X	Yes	10	1	1	1

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	70	20	10	5
Very Active	**≥ S3 ***	No	2	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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